

## K4 SOFTWARE RELEASE NOTES

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===== RELEASE 29 =====  
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March 22, 2022

NOTE: The RX DVR feature (AF REC/AF PLAY) has been deferred until the next software release in order to complete more extensive testing.

### ===== FUNCTIONAL CHANGES =====

ENHANCED SPEECH COMPRESSION & CESSB: Speech compression has been dramatically improved. Controlled Envelope Single Sideband (CESSB) has also been implemented. Together, these boost average talk power by up to 8 dB, with virtually no RF overshoot or in-band distortion. Any nonzero setting of CMP also engages CESSB. Compression also now applies to Extended Single Sideband (wide transmit bandwidths).

TX NOISE GATE: This feature is available in all voice modes. Set up using MENU:TX Noise Gate Threshold. Default is OFF. If a non-zero value is selected, mic audio will be suppressed during transmit when it is below the given threshold.

NEW NARROW CW FILTERS: We've added new CW filtering for the 50/100/150/200 Hz settings -- the highest-performance narrow filters we've ever offered. These filters have much steeper skirts, yet exhibit minimal ringing. They're enabled by default, but can be turned off using the RX CW IIR Filters menu entry. When they're off, the filters will be the same as they are now (FIR). These filters are centered on 50 Hz pitch increments, which means that the narrowest filter width (50 Hz) slightly favors 50 Hz increments of the sidetone PITCH setting. For example, if you were using a 530 Hz sidetone, consider using 500 or 550 Hz instead.

ALL-MODE SQUELCH: Main and sub receiver squelch can now be used in all modes. The settings are independent.

NOISE BLANKER QRM FILTERING: All noise blankers can be compromised by strong nearby signals. If you hear artifacts, use the NB LEVEL control to turn NB QRM filtering on, then retry different NB levels. There are 3 NB filter settings:

NARROW: K4 bases NB filter on regular RX bandwidth (as low as 1 kHz)  
WIDE: K4 applies a 5 kHz NB filter  
NONE: pre-NB filtering off (BW ahead of NB ~24 kHz)

NOTE: The NARROW and WIDE settings may reduce effectiveness on some noise types, so use NONE when there's no QRM.

NEW AM DEMODULATOR: Our new AM demodulator provides excellent audio fidelity, with up to 5 kHz audio bandwidth and enhanced pre-demodulator filtering.

IMPROVED FM DEMODULATOR.

VFO CURSOR OFF-SCREEN ICONS: The panadapter now provides color-coded arrows (A=blue, B=green) that appear if the associated VFO frequency is off-screen. The arrow shows the off-screen direction.

VFO COARSE TUNING RATES (PER-MODE): Added a new menu entry, VFO Coarse Tuning, that specifies which of four per-mode tuning rates is to be used when the KHZ switch function is selected. (This is equivalent to the K3's COARSE switch function.) For example, in SSB mode, the "KHZ" tuning rate options are 0.1, 0.5, 1.0, and 2.5 kHz. When the user-specified KHZ rate is selected, the VFO digit underline changes from white to gold. These selections also apply to the RIT control whenever RIT is \*OFF\* and MENU:RIT Knob Alt Function is set to VFO CRS. Tapping VFO digits to select a tuning rate overrides the KHZ tuning rate.

NEW TRANSMIT MONITOR LINE-OUT MODES: Menu entry "TX Monitor Level, Line Out" sets the level of the transmit monitor signal (sidetone or voice) at the LINE OUT analog jack as well as digital line out (USB-B jack). At the default setting ("=MON"), the LINE OUT TX monitor level reflects the setting of the regular XMTR-MON knob function. Rotating VFO A counter-clockwise from here will select "OFF" mode (no TX monitor line out signal). The other available settings (numeric) will scale the LINE OUT transmit monitor function upward, which is useful for some external devices such as audio recorders. (These values will also prevent K4 switch tones from being heard at LINE OUT.) Max TX monitor LINE OUT level is about 2 Vpp.

TX BAR GRAPH FLICKER ELIMINATED: Previously, the power and SWR bar graphs exhibited rapid cycling or flickering in voice modes.

VOX-OFF WARNING IN CW MODE: If you send CW with VOX turned off (and PTT/XMIT not asserted), you'll now get a warning about not putting out any RF. You may ignore the warning if you're simply testing the keyer, sidetones, etc.

STUCK-KEY WARNINGS: Individual warnings are provided for all "stuck-key" situations on power-up, including PTT, KEY IN, DOT, and DASH.

DIGITAL AUDIO PROCESSOR (DAP) VOLTAGE REPORTS: The DAP now correctly reports its various supply voltages and temperature. To see these, use Status/All Param.

AM/FM VOX DELAY CORRECTED: These modes now use the voice VOX delay setting.

===== FOR SOFTWARE DEVELOPERS =====

(Refer to rev. C1 or later of the K4 Programmer's Reference)

NB COMMAND CHANGE: The NB command format has changed to NBnnmf, where nn is the NB level, m is 0/1 (off/on), and f is the pre-NB filter mode (0=NONE, 1=NARROW, 2=WIDE). See description of filter settings above.

NEW COMMANDS:

- AG/ AF gain toggle
- BL AF balance
- DA digital audio
- DW data TX bandwidth (DATA & AFSK modes)
- PB DVR playback
- VT\$ VFO tuning step
- #CUR\$ VFO Cursor Display Mode
- #PKM/ toggle panadapter peak mode
- #VFA/B added toggle commands

ME43 COMMAND FIXED: This now correctly returns the radio's IP address.

PB0 COMMAND TERMINATES DVR PLAY.

XT/ TOGGLE COMMAND FIXED: This command now correctly toggles XIT on/off.

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==== RELEASE 28 ====

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JAN. 5, 2022

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NOTE: IF YOU USE NON-FLAT TRANSMIT EQ, you will need to re-adjust the settings after loading this software release. This is further described under BUG FIXES, below.

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===== FUNCTIONAL CHANGES =====

AUDIO OUTPUT IMPROVED BY 10 DB: In previous releases, maximum audio output may have been as much as 10 dB lower than the target value with some combinations of the AGC slope and threshold menu settings. Now, maximum AF output is pre-compensated for AGC behavior. This

results in a minimum speaker output of about 1.5 W into 4 ohms and 1.0 W into 8 ohms. (The new AF output specification will be at 1 W rather than 2 W.)

S-METER NOW 6 dB PER S-UNIT: S-meter calibration now matches the more common industry standard. (Previously it was 5 dB per S-unit.) With this change, each tic mark of the S-meter graphic represents 3 dB.

DVR (DIGITAL VOICE RECORDER): The DVR can now be used for transmit voice message record/play. There are 8 messages (2 banks of 4). Tap REC, then follow on-screen prompts. Messages can be played without on-air transmit by using transmit test mode (TEST switch). Maximum message length is 90 seconds.

NEW BACKUP/RESTORE FUNCTION: Tap Fn, then hold BACKUP. This brings up the backup/restore screen. You can select whether to backup or restore five categories of data, including General Configuration, Frequency Memories, PF Key and K-Pod Macros, CW/PSK/FSK messages, DVR messages, and Diagnostic Logs.

SEPARATE TX MONITOR LINE-OUT LEVEL CONTROL: Use TX Monitor Level, Line Out menu entry. Applies to both sidetone and voice monitoring, as well as to both analog and digital line out.

ICON CHANGE FOR RX DYNAMIC RANGE OPTIMIZATION: The original icon, a visual hybrid of 'D' and 'R', was judged too cryptic by users. The new icon is "DR+", allowing the operator to for search for it in the operating manual.

BUILT-IN OPERATING MANUAL UPDATED TO REV. C12. Covers all recent changes.

===== BUG FIXES =====

TX EQ SLIDERS NOW +/- 16 dB: The EQ sliders had been incorrectly set to +/- 4 dB. If you use non-flat EQ, you may need to do a one-time readjustment of the sliders.

ELIMINATED DUAL IP ADDRESSES for the radio. This occurred very rarely.

MENU IP ADDRESS FIELD EXPANDED: The parameter field now accommodates 12-digit IP addresses.

ELIMINATED LOSS OF AUDIO on power-up (rare).

VFO STEP RATE PRESERVED across power-downs.

TX METERS STAY ON IF SPLIT TURNED ON/OFF WHILE TRANSMITTING.

SBC DATE CORRECTED ON 3V BATTERY SWAP.

===== FOR SOFTWARE DEVELOPERS =====

ADDED VO\$ COMMAND (VFO OFFSET). This can be used to directly offset either VFO by a specified amount.

ADDED XVTR SUPPORT FOR BN+; and BN-; commands.

FI\$; COMMAND AI RESPONSE NOW SENT ON BAND CHANGE.

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==== RELEASE 26 ====

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26 OCTOBER 2021

NOTE: If you experience any issues after a software update, please do the update a second time. This is usually because your K4 has not been updated recently. The software update application itself is subject to change, and a second attempt will complete any pending steps.

LCD FLICKER REDUCED: LCD DC-DC converter PWM frequency changed to 15 kHz to greatly reduce likelihood of artifacts at low brightness settings. (Was 19 kHz.)

MESSAGE PLAY CANCEL: In CW mode, cancelling message play would sometimes result in the orange message-play icon remaining on.

TX ALC MENU ENTRY: TX ALC should only be turned off under very specific circumstances; most users will never need to do this. To prevent unintentional changes to the MENU:TX ALC setting, the user is given an opportunity to cancel an ALC OFF action.

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==== RELEASE 25 ====

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14 OCTOBER 2021

===== FUNCTIONAL CHANGES =====

NORMALIZED RECEIVER PASSBAND INDICATION: When the filter passband is normalized for the main or sub receiver, its passband graphic acquires two small "wings". (Same as the K3, etc.) To normalize the passband, hold the FILTER knob (NORM function).

DIGOUT1 MENU ENTRY: DIGOUT1 is an open-drain output that can be used to control external

equipment. It is stored per-band. On the 160-6 meter bands it is also stored separately per-antenna if a KAT4 ATU is installed. The default is OFF (floating), while ON = pull the line to ground (0 V). Max load current in the ON state is 15 mA; max. load voltage in the OFF state is 25 V DC. The menu entry shows/changes the DIGOUT1 setting on the present band (and antenna if 160-6 m).

SELECTABLE DATE FORMAT: The desired date format (EU or US) can now be selected using the DATE/TIME set controls. To access this, first tap in the date/time/status area (above the "?" Button on the LCD), then hold the DATA/TIME "Set" button. MM/DD/YY or DD/MM/YY format can be selected independent of the other controls in this window.

LINE OUT RIGHT-CHANNEL AUDIO (SUB RX) EQUALS LEFT CHANNEL (MAIN) WHEN SUB IS OFF.

3 dB RECEIVER GAIN ADDED TO BOTH RECEIVERS WHEN SPLITTER IS IN: When the sub RX is on and sharing the same antenna as the main RX, we now add 3 dB of IF (DSP) gain to compensate for the loss of the 3 dB splitter.

TX INHIBIT CHANGES: The TX Inhibit icon now continuously reflects the state of the TX INH signal (ACC jack, pin 7) rather than only during transmit. Also, when MENU:TX Inhibit is set to OFF, pin 7 correctly outputs a logic high (5 V) at all times.

RX ANT OUT ON BASIC K4: The RX ANT OUT jack can now be used on a basic K4 (one without the KRX4 2nd RX module) in both the SUB RX ON and OFF conditions. Previously, the sub RX icons and controls were not reflecting the fact that, on a basic K4, the main and sub receivers always share the same antenna. This in turn was preventing the sub RX from being configured properly for RX ANT OUT usage.

===== BUG FIXES =====

SUB RX GAIN NOW SAME AS MAIN RX: Previously, the same signal injected into both receivers would produce a signal level 3 to 6 dB higher in the sub RX (as indicated by both the S-meter and panadapter). This was due to an incorrect ADC gain setting in the sub.

EXTERNAL MONITOR STUCK ON ELECRAFT LOGO: The external monitor should no longer freeze on a logo screen after a display mode change.

LOSS OF QSK SETTING ON MESSAGE PLAY CANCEL: Fixed.

A/B REVERSE CONTROL NOW ONLY SWAPS VFO FREQUENCIES: Previously, A/B reverse ("REV" switch) swapped all settings of VFOs A and B. Swapping only the frequencies makes this operation much faster.

ESSB MODE AND SSB/SSB BANDWIDTHS SAVED: These settings are now correctly saved/restored across power-downs.

REAR-PANEL MIC BIAS SHUTOFF FIXED: Rear panel mic bias is no longer being turned off when rear panel headphones are plugged in/unplugged.

CW AUTO-TUNE WORKS IN CW-REVERSE MODE.

HIGH-SIGNAL PANADAPTER ARTIFACTS ELIMINATED: Under some high-signal conditions, a comb pattern or "Christmas tree" effect may have been overlaid on spectral peaks. This was due to signal leakage in the FFT/decimation algorithm. The effect has now been completely eliminated.

OVERALL DATA FLOW STABILITY IMPROVED: Previously, in very rare cases, the panadapter may have stopped updating due to an issue with memory allocation.

MULTIPLE IP ADDRESS PROBLEM: Corrected a situation where the radio could claim to have two separate IP addresses.

===== FOR SOFTWARE DEVELOPERS =====

REMOTE CONTROL COMMAND IMPROVEMENTS:

- DO; command added
- WM; command added. See also ME0027; (Wattmeter Cal in MENU)
- RG; response bug fix
- CP; response bug fix
- GT\$; response bug fix

- REF; no longer case sensitive
- TEF; no longer case sensitive

IS\$9xxx; now supported as FP\$~; alias

- SD; command improvements
  - \*Added SD1; SDO; setter for setting QSK
  - \*Added SD; getter for current mode
  - \*Added SDm; getter for provided mode

- VG; command improvements
  - \*Added VG; getter for current mode
  - \*Added VGm; getter for provided mode

- VX; command improvements
  - \*Added VX1; VXO; setter VOX for current mode
  - \*Added VX; getter for current mode
  - \*Added VXm; getter for provided mode

SM; command bug fixes  
\*SM; now properly returns 0000-0015 in K30; meta-mode.  
\*SM; now properly returns 0000-0021 in K31; meta-mode.  
\*SM; returns 00-42 in K41; meta-mode.  
\*Note, for SM; auto-information; set AI4;SM1;

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==== RELEASE 22 =====  
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8-10-2021

BUILT-IN OPERATING MANUAL UPDATED: Now at rev. C9. Among other changes, includes important note about Bose QC35 and similar headphones that are capacitively coupled. These will work with the rear-panel phones jack as-is, but for use with the front panel jack, a resistor to ground from the tip signal is needed to provide headphone insert detection.

SCREEN CAPTURE IMPROVEMENT: There is no longer any need to remove and reinsert the USB flash drive after every screen shot.

TX EQ NOT APPLIED IN DATA MODES.

FSK/PSK MONITOR LEVEL ADJUSTABLE: FSK/PSK monitor level is now equal to the DATA monitor level, not by the CW sidetone level. It can be set separately by holding {XMTR}.MON.

FSK/PSK MONITOR LEVEL VIA PADDLE VS. FSK IN: When FSK/PSK characters are sent using the keyer paddle, the FSK/PSK monitor tones will be 12 dB below the CW sidetone volume, as before. But when FSK/PSK transmit is initiated via XMIT, PTT, or a KY command, the monitor volume will be set based on the DATA monitor level (cf.dataMonLevel).

VFO CURSORS TUNE SMOOTHLY ON PANADAPTER: Some users had observed jitter in the panadapter cursors while tuning the VFO.

TRANSVERTER BANDS > 2.1 GHz BEHAVE CORRECTLY AT PANADAPTER: Previously, use of transverter band frequencies above 2.147 GHz would cause the panadapter to freeze.

ADC OVERFLOW FALSE TRIGGERING ELIMINATED: Previously, changing preamp or attenuator settings could cause a spurious ADC overflow indication ("OVF" icon at the right end of the S-meter).

PRE3 SETTING PRESERVED ACROSS POWER CYCLES.

BUILT-IN OPERATING MANUAL IMAGES CORRECTED: All figures are now correctly formatted, including the illustration of the RX Dynamic Range icon (see Advanced Receive Features section).



USB FLASH DRIVES WITHOUT OPERATING SYSTEM PARTITIONS: These are now handled correctly.

DURING SOFTWARE UPDATE, EXT. MONITOR MIRRORS LCD.

FOR SOFTWARE DEVELOPERS: Switch emulation codes (SW command) now have permanent fixed values, per rev. B12 or later of the K4 Programmer's Reference. Previously, these codes were inadvertently changed as new switch functions were added.

SOFTWARE UPDATER SHOWS RELEASE PACKAGE NUMBERS: When the user selects an installation type, the associated "Rnn" release numbers appear beside each type (production, beta, etc.).

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==== RELEASE 19 ====
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6-23-2021

MAX AF GAIN INCREASED.

MAX VOICE MONITOR LEVEL INCREASED.

DATA MONITOR LEVEL BUG FIX: Previously, the lowest active level (1) was too loud. Also increased max value.

K-POD SWITCH MACRO PROGRAMMING: In the K4's built-in macro editor, K-Pod switches now listed as 1 tap, 1 hold, 2 tap, 2 hold, etc.

DYNAMIC RANGE ICON: When MENU:RX Dyn. Range Optimization is set to ON, a new icon appears to the right of the RIT/XIT box. The icon is a hybrid of the capital letters 'D' and 'R'.

MORE PROMINENT ADC OVERFLOW INDICATION: In an extreme strong-signal situation, it is possible to reach the highest voltage allowed by the A-to-D converter. In this case the S-meter's "+60" label will change to "OVF" until the condition is resolved. (Previously, the "+" sign in the label simply changed color.) In most cases you won't hear any change in the receive audio when this occurs, especially if it occurs rarely. But if it happens frequently, you may wish to reduce the front-end gain of the affected receiver(s). The K4 can automatically reduce gain incrementally in this situation; set MENU:RX Auto Attenuation to ON.

EXTERNAL REFERENCE LOCKING NOW MORE ACCURATE: When locked to an external reference, the K4's VFOs should now be within +/- 1 Hz across the full tuning range. Previously the reading was slightly high, as much as +5 Hz at 50 MHz (0.1 ppm).

AGC PULSE REJECT IMPROVEMENTS: Previously, with MENU:AGC Noise Pulse Reject set to ON, AGC was being modulated by noise and signals under some band conditions. Now, the pulse reject threshold moves upward in response to strong signals to prevent this from occurring. Note: In the presence of very strong continuous noise, turn on the noise blanker. It is highly effective in this case even at very low settings.

AGC DECAY RANGE EXPANDED: For example, MENU:AGC Decay, Slow can now be set as low as 5 (very slow).

TRANSVERTER BANDS: Frequency memories and direct frequency entry now support transverter bands (up to 99 GHz).

SOFTWARE UPDATE: Software update function now handles missing internet connection correctly. Save/Restore function handles K-Pod macros. Button debounce improved.

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==== RELEASE 18 ====

6-8-2021

NEW STATUS DISPLAY -- TIME/TX: There's a new option for the status area display: time (Z) and TX parameters (power and SWR). To select this option, tap the status area (above the "?" Button), then tap TIME/TX.

TRANSVERTER BANDS: The K4 now has 12 user-programmable bands for use with external transverters. Transverter bands must be set up prior to use using the XVTR menu entries. The first XVTR menu entry specifies which of the 12 bands is being set up. Once setup is complete, you can tap BAND > XVTR > XVTRn to switch VFO A to a desired transverter band. Tap BAND > HF to go back to the last HF-6 m band. VFO B can be directly set to a transverter band by tapping BSET, then the BAND button.

DUAL TRANSVERTER BAND RECEIVE: You can receive on two external transverters simultaneously with a K4D. Set up one to use RX ANT 1 and the other to use XVTR IN/RX ANT 2.

RX DYNAMIC RANGE OPTIMIZATION: By default, new menu entry "RX Dyn. Range Optimization" is turned on. This configures the A-to-D converter for best dynamic range. Turning this off may slightly improve sensitivity. At present the setting applies to all bands; in a future release it may be settable per-band.

VFO CURSORS CAN BE MOVED DURING TRANSMIT: If you move the VFOs during transmit, the

associated panadapter cursors will update, even though the spectrum and waterfall remain frozen.

BUILT-IN KEYBOARD UPDATED: All extended punctuation keys are now grouped to the right side of the keyboard. A new key has been added for tilde (~) and single quote (').

FOR SOFTWARE DEVELOPERS: (1) SPLIT is now exited on receipt of and FR0 or FR1 command. (2) Added support for #ARM; #ARA; #AR/;. (3) Added transverter selection and setup commands: XV, XVM, XVR, XVI, XVO, XVP commands.

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==== RELEASE 17 ====

5-27-2021

DATA-MODE BANDWIDTH RESTORED: Data mode bandwidth is now correctly saved/restored across power cycles.

RELEASE NOTES LISTING: When viewing release notes in the software update screen, they now start at the beginning of the listing rather than at the end.

RECEIVE IMPROVEMENT: DSP code has been updated to suppress a 12 kHz offset spur that could be observed above the noise floor with an extremely strong signal (S9+40 or so).

FOR SOFTWARE DEVELOPERS: Add support for TD/; VT/; (fine toggle) and VT\; (coarse toggle). Added K3 legacy switch translation for SWH49;SWT49;

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==== RELEASE 16 ====

5-25-2021

TX DELAY SETTINGS: There is now only one TX DLY menu entry: TX DLY, Key Out to RF Out. The delay range is 5 to 25 ms; default is 8 ms. NOTE: Use the smallest value needed for external amp switching. 5 ms recommended for fast CW QSK speed (this compatible with Elecraft amplifiers).

RECEIVE BANDWIDTH: Accuracy of FILTER BW control settings improved.

SSB AND ESSB TX BANDWIDTH: Completed TX SSB/ESSB bandwidth controls. Tap TX > ESSB ON/OFF to turn ESSB on or off. The button to the left sets the SSB or TX bandwidth independently. When ESSB is in effect, a "+" sign is added to the LSB or USB mode indicator. Also, speech

compression is turned off. NOTE: In regular SSB modes, when speech compression (XMTR > CMP) is set to any value other than 0, the transmit bandwidth is reduced slightly to emphasize mid-range speech components. In a future release this behavior will be adjustable.

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==== RELEASE 15 ====  
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5-24-2021

10-KHZ LCD "WHINE" ELIMINATED.

MACRO EDITOR: Added initial support for macro command string creation and editing. Tap Fn, then hold MACRO. Macros can be assigned to PF1-PF4, F1-F8, REM ANT switch, and all 16 K-Pod switches. Refer to K4 Programmer's Reference for command details. Full details on the macro editor will be available in the operating manual on next update.

FOR SOFTWARE DEVELOPERS: Added support for "ping" over Ethernet. Added commands NA/; SP/; BS/; TX/; FX/; DV/; DV\;. Added translations for legacy K3 switch emulation commands: SWH11; SWH14; SWT14; SWT16; SWH29; SWT29; SWH32; SWT32; SWT33; SWT34; SWT42; SWT43; SWH50; SWT53; SWH58;. Fixed K-Pod RIT control and screen capture issues.

SSB AND ESSB BANDWIDTH: The TX bandwidth can now be set for both SSB and ESSB (Extended SSB). Tap TX > SSB BW to set bandwidth. Tap ESSB to turn ESSB mode on/off.

PANADAPTER CURSORS: The cursors in the panadapter spectrum display now extend into the waterfall during VFO movement.

SOFTWARE UPDATER UI IMPROVEMENTS: Improved feedback on switches and during software update operations.